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ABSTRACT

An experiment was conducted to determine the effect of providing learners with instructional objectives prior to instruction with non objectives-based materials. The objectives of these materials were inferred by the researchers. Sixty-four university students were randomly assigned to treatment groups in which they received either no objectives, a partial list of objectives, or a complete list of objectives for an instructional film viewed together by all groups. Mean scores on an 18-item criterion test, which contained one item per objective, were significantly higher for subjects receiving objectives than for those receiving no objectives. Learners who received partial lists of objectives performed as well or slightly better on the test portion for which they received no objectives. It was thus concluded that providing objectives to students prior to presenting instructional materials not based on objectives facilitates student performance and that presentation of partial lists of objectives did not appreciably limit the students' attention to content for which they had received objectives. (Author)

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USE OF INFERRED OBJECTIVES WITH NON-OBJECTIVES BASED INSTRUCTIONAL MATERIALS

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This experiment was conducted to determine the effects of providing learners with instructional objectives prior to instruction with non-objectives-based materials from which the objectives were inferred by the experimenters. Sixty-four university students were randomly assigned to one of four treatments in which they received either no objectives, a partial list of objectives, or a complete list of objectives for an instructional film viewed together by all groups. Mean scores on the 18-item criterion test, which contained one item per objective, were significantly higher for *S*s receiving objectives than for *S*s receiving no objectives. Learners who received partial lists of objectives performed equally well or slightly better on the test portion for which they received no objectives

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than did learners who received no objectives, thus indicating that presentation of objectives did not appreciably limit their attention to content not relevant to the objectives.

SUMMARY

PROBLEM

The practice of supplying students with behavioral objectives for a set of instructional materials is commonly believed to facilitate learning. However, research investigating this question has yielded contradictory results. Generally, studies yielding positive results from presentation of objectives to learners have involved use of materials that were not originally developed to implement learner attainment of specific objectives, whereas the investigations in which presentation of objectives was not effective involved use of objectives-based materials that were well designed originally.

APPROACH

Four groups of subjects were presented the same training film after each group received different preliminary study instructions. The study instructions contained: (1) all objectives, (2) odd numbered objectives, (3) even numbered objectives, and (4) no objectives, but directions to S to pay attention to details and examples. A criterion test was administered to all groups immediately following the showing of the film.

RESULTS

All three groups receiving a partial or complete list of objectives scored significantly higher than the group receiving no objectives. Subjects who received partial lists of objectives performed equally well or slightly better on the test portion for which they received no

objectives than did subjects who received no objectives. The group that received all objectives scored significantly higher on the even numbered objectives than the group given only even numbered objectives. There was not a statistically significant difference between the group receiving all objectives and the group receiving only odd numbered objectives on the questions for the odd numbered objectives.

CONCLUSIONS

This study indicates that providing objectives to students prior to presenting instructional material that was not based originally on objectives will facilitate studen performance. The evidence does not support the notion that the facilitating effect is at the expense of student acquisition of information other than that specified by the objectives.

This summary was prepared by G. B. Reid, Simulation Applications Branch, Flying Training Division, Air Force Human Resources Laboratory.

PREFACE

This study was conducted by the Educational Technology Department, Arizona State University under contract F41609-71-C-0027. Dr. Howard J. Sullivan directed the research performed by the experimenters Curtis L. Taylor, Kenneth C. Roberts and Patrick E. Smith; Captain Gary B. Reid served as contract monitor for the Flying Training Division. The research was accomplished under Project 1123, USAF Flying Training Development; Task 112302, Instructional Innovations in USAF Flying Training.

This report contains implications for improving USAF training, especially as an interim measure for instruction that has not been subjected to Instructional Systems Development according to Air Force Manual 50-2.

USE OF INFERRED OBJECTIVES WITH NON-OBJECTIVES-BASED INSTRUCTIONAL MATERIALS

A popular belief among instructional design personnel is that providing learners with a list of the behavioral objectives for a set of instructional materials will increase their learning from the materials. Support for this belief can be found in Mager's (1962) statement that "If you give the learner a copy of your objectives, you may not have to do much else," as well as in the writings of other authorities.

Recent evidence on the effects of presenting objectives to learners prior to instruction is contradictory. Some studies (Allison, 1964; Blaney and McKie, 1969; Dalis, 1970) indicate positive effects from such a procedure, while other studies (Jenkins and Deno, 1971; Stedman, 1971) indicate that the availability of objectives does not affect performance. Generally, the studies yielding positive results from presentation of objectives to learners have involved use of materials that were not originally developed to implement learner attainment of specific objectives, whereas the investigations in which presentation of objectives was not effective involved use of objectives-based materials that were well-designed originally. It seems plausible, therefore, that presentation of objectives may enhance post-instructional performance only when explicit objectives have not been specified prior to develop-

ment of the instruction and when the instruction does not incorporate such principles of good instructional design as knowledge of results and learner practice of the criterion tasks.

Presentation of objectives prior to instruction should also be considered in terms of its effect on learner performance on the portions of the instruction not related to the stated objectives. If, as Kibler, et al. (1970) speculate, the presentation of objectives enables learners to focus their efforts on acquiring relevant behaviors from instruction and to limit their attention to the remaining instructional material, one might expect that learners would perform better on the objectives presented to them and less well on the remaining material than would learners who did not receive a list of objectives. Thus, when contrasted with a group receiving no objectives prior to instruction, learners presented with a partial list of objectives might be expected to perform better on the objectives contained in their list but not as well on the omitted objectives. Presumably, learners in the "no objectives" group would distribute their attention more evenly over the instruction, thereby acquiring more content related to the objectives not included in the partial list.

Most materials used for instructional purposes are not developed on the basis of pre-specified objectives and are not well designed to facilitate learner attainment of objectives. If the presentation of a set of objectives for such non-objectives-based materials does indeed facilitate learner attainment of these objectives, then performance on these objectives can be improved simply by inferring the objectives for

the instructional materials and presenting them to the learners prior to their use of the materials. It is likely, however, that the instructional materials include content and potential objectives which were considered to be important by the original developers of the material, but which were not included in or directly relevant to the objectives inferred later by other individuals. If presentation to learners of the set of inferred objectives causes them to concentrate heavily on the objectives-related content, it may have the effect of inhibiting their achievement with respect to the content not directly related to the inferred objectives.

The purpose of present study was to determine the effects of presentation to learners of lists of objectives inferred from non-objectives-based instructional materials on the learner's post-instructional performance on both the instructional objectives presented to him and on content not directly relevant to these objectives. Prior to instruction, groups of learners were presented with no objectives, partial lists of objectives, or a complete list of objectives inferred from a non-objectives-based instructional film. Following showing of the film, all groups of learners were posttested on all objectives. Performance of each group was then analyzed both on the objectives (if any) included in the list presented to the group prior to instruction and on the objectives not included in this list.

METHOD

Subjects. The subjects were 64 university juniors and seniors enrolled in an audio-visual education course for pre-service teachers at Arizona State University.

Instructional Materials and Procedures. Two types of materials, the film and the lists of objectives, were employed in the study. The film, The Remarkable Schoolhouse, produced by CBS Television, 1967, served as the instructional material. This 25-minute color film describes the organization and activities of three "innovative" school systems in the United States.

The instructional objectives for the film were inferred by the experimenters on the basis of film's content. Two of the experimenters independently developed lists of objectives for the film. Eighteen objectives were common to both lists and were therefore selected to serve as the final set of inferred objectives for the film. Three additional objectives appeared on only one of the two lists and consequently were eliminated from the final list.

The list of 18 inferred objectives was used as the basis for constituting four treatment groups. As each S entered the classroom for his regular audio-visual education class, he was assigned at random (without his knowledge) to one of the four groups and was given the instruction sheet appropriate to his particular treatment. A total of 16 Ss were assigned to each group. The content of the instruction sheets for the four groups differed as follows:

Group 1 - all 18 objectives

Group 2 - the nine odd-numbered objectives

Group 3 - the nine even-numbered objectives

Group 4 - no objectives, but directions to S to pay attention to details and examples

A statement preceding the list of objectives on the instruction sheets indicated that the objectives represented tasks that S would be expected to be able to perform after seeing the film.

At the beginning of class, Ss were informed that they were participating in an experiment to determine the effects of instructions on viewing a film. Ss were also told to work only with their own instruction sheet and not to take notes during the film. Four minutes were then allowed for Ss to read their particular set of instructions. Following this four-minute period, the film was shown to all Ss. Auditorium lights remained on during the film presentation at a level high enough so Ss could read their instruction sheets.

As described above, the four treatment groups differed experimentally only with respect to the content of the instruction sheets distributed prior to the film. The basic instructional material (the film) was the same for all four groups.

Criterion Test. The criterion test was administered to all Ss immediately following the showing of the film. The test consisted of one completion item per objective, or a total of 18 items. In order to determine the relationship between pre-instructional knowledge of objectives and post-instructional performance on the objectives, the criterion test performance of each group was computed separately on the nine odd-numbered and nine even-numbered objectives, as well as across all 18 objectives.

RESULTS

The criterion test mean scores are shown in Table 1 for each treatment group on the total test and on the items for both the nine odd-

Table 1

Criterion Test Mean Scores by Treatment

Treatment Group*	Mean Test Scores: Odd-numbered objs. (9 items)	Mean Test Scores: Even-numbered objs. (9 items)	Totals (18 items)
1. All 18 objectives	6.19	5.81	12.00
2. 9 odd-numbered objectives	5.94	4.68	10.62
3. 9 even-numbered objectives	4.44	5.87	10.31
4. No objectives	4.44	4.18	8.62

*N = 16 per group

numbered objectives and the nine even-numbered objectives. It can be seen from the table that the total scores ranged from a high of 12.00 for the group receiving all 18 objectives (Group 1) to a low of 8.62 for the group receiving no objectives (Group 4). A one-way analysis of variance on total test scores yielded a statistically significant F-ratio of 5.68 ($p<.01$). A Scheffé test of between-group differences revealed that on the total test all three groups receiving a partial or complete list of objectives scored significantly higher than the group receiving no objectives. The group receiving all 18 objectives (Group 1) also scored significantly higher than the group receiving even-numbered objectives only (Group 3). The other between-group differences in total test scores were not statistically significant.

Table 1 reveals that, on the test items for the odd-numbered objectives, the two groups that received a list of the odd-numbered

objectives prior to instruction (Groups 1 and 2) attained mean scores of 6.19 and 5.94, as contrasted with means of 4.44 for each of the two groups that did not receive the odd-numbered objectives prior to instruction. A one-way analysis of variance yielded a statistically significant difference ($F=8.28$, $p<.01$) in mean test scores for the odd-numbered objectives. A Scheffé test revealed that the mean scores of each of the two groups receiving the odd-numbered objectives were significantly higher than the means of each of the two groups not receiving odd-numbered objectives.

On the test items covering the even-numbered objectives, the mean scores for the two groups that received lists of even-numbered objectives (Groups 1 and 3) were 5.81 and 5.87, as compared with scores of 4.68 and 4.18 for the two groups that did not receive copies of the objectives. The one-way analysis of variance for mean test scores on even-numbered objectives also yielded a statistically significant difference ($F=4.16$, $p<.01$). The group that received even-numbered objectives only (Group 3) scored significantly higher than both groups that did not receive lists of even-numbered objectives. Group 1 (all objectives) scored significantly higher than the no-objectives group (Group 4), but the difference between Group 1 and Group 2 was not significant.

Data relevant to the effects of presentation of objectives on learner performance on the content not related to the presented objectives are also contained in Table 1. Learners who received partial lists of objectives (Group 2 and 3) performed equally well or slightly better on the test portion for which they received no objectives than

did learners who received no objectives at all (Group 4). Thus, learners who were presented with a list of objectives apparently did not pay less attention to the non-objectives-related content than learners who received no objectives and who consequently might be expected to distribute their attention more evenly over the instructional material.

DISCUSSION

The present study was conducted to determine the effects of presenting the learner with a set of instructional objectives prior to instruction with non-objectives-based instructional materials from which the objectives were inferred. Effects of presentation of the objectives were investigated both with respect to post-instructional performance on both the objectives presented to learners and on other objectives inferred from the instructional material but not specified for the learners.

The data from the study indicate unequivocally the facilitating role of the pre-instructional presentation of objectives on post-instructional learner attainment of objectives. Significant differences in post-test mean scores were consistently observed in favor of groups who received the instructional objectives prior to instruction. Among pairs of treatment groups in which one group received more objectives than the other, all of the 13 possible comparisons on part-test and whole-test scores favored the group receiving more objectives.

The present findings differ markedly from the recent results obtained by Jenkins and Deno (1971) with the pre-instructional presentation to learners of the instructional objectives of well-designed

programmed materials. These differential findings lend support to the notion that presentation of objectives to learners is most effective in facilitating performance on non-objectives-based materials that do not systematically incorporate good principles of instructional design.

One explanation for the potential effectiveness of providing the learner with a statement of objectives prior to instruction has been that the objectives enable him to focus his efforts on acquiring relevant behaviors from instruction and to limit his attention to less relevant material (Kibler, et al., 1970). Although learners who received partial lists of objectives in the present study did perform better on the tasks for which they received objectives, they also performed as well on the tasks for which they did not receive objectives as did learners who received no objectives at all. These data suggest that the learners who received partial lists of objectives also gave at least an equal amount of attention to other content (i.e., content not related to the objectives in their list) as did individuals who received no objectives.

While the present study provides evidence of the effectiveness of use of inferred objectives with non-objectives-based instructional material, additional research is needed to determine the generalizability of the present findings to other instructional conditions and materials. It seems likely, for example, that even better results may be obtained from use of objectives with textual material under conditions where learners are allowed to take notes and to allocate their time as desired to the material. Since learners can differentially control their exposure time to various segments of printed material to a much greater

degree than they can with a film, they should be able to concentrate as heavily as they desire on objectives-relevant content. On the other hand, learners viewing a film are exposed rather automatically to both the objectives-relevant and objectives-irrelevant content, whereas it may be easier for a learner to skip or minimize his attention to objectives-irrelevant content in textual material. Therefore, learners who receive inferred objectives for textual material prior to instruction may perform less well on content not related to these objectives than learners receiving no objectives. Further research on use of inferred objectives should be conducted with a variety of non-objectives-based materials to determine the types of materials and conditions with which such objectives can be used most effectively.

REFERENCES

Allison, J.F. Effects of an experimental study and on achievement in plane trigonometry of Texas A&M students. Doctoral dissertation at Texas A&M, 1969.

Blaney, J.P. & McKie, D. Knowledge of conference objectives and effect upon learning. Adult Education Journal, 1969, 12(2), 98-105.

Columbia Broadcasting System--Television. The remarkable schoolhouse, 16mm sound-color motion picture, McGraw-Hill Textfilms, New York, N.Y., 1967.

Dalis, G.T. Effect of precise objectives upon student achievement in health education. The Journal of Experimental Education, 1970, 39(2), 20-23.

Jenkins, J.R. & Deno, S.L. Influence of knowledge and type of objectives on subject-matter learning. Journal of Educational Psychology, 1971, 62, 67-70.

Kibler, R.J., Barker, L.L., & Miles, D.T. Behavioral objectives and instruction. Boston: Allyn and Bacon, Inc., 1970.

Mager, R.F. Preparing instructional objectives. Palo Alto: Fearon, 1962.

Stedman, C.H. The effects of prior knowledge of behavioral objectives on cognitive learning outcomes using programmed materials in genetics. Doctoral dissertation at Indiana University, 1970.